# CURRENT SITUATION, PROBLEMS AND COUNTERMEASURES ON GENERAL CONTRACTING IN CHINA

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**Abstract:** General contracting (GC) is an internationally accepted organization pattern of project construction. Since Chinese government encouraged the construction industry to develop GC enterprises in early 1980s, it has made great progress. This paper first discusses the current situation of GC in China, and several GC approaches: EPC/Turnkey, design-build (D-B), procurement-construction (P-C), etc. Then, it analyzes some problems which exist in the development of GC, including unreasonableness of GC enterprises' organizational structure, lag in project management (PM) techniques, lack of high-quality PM talents, lack of government policies, insufficiency of legislation of GC, lowness of market identity degree, and so on. According to above-mentioned problems, the countermeasures about the development of GC are studied, including external environment construction of enterprises and approaches to intensifying enterprises own strength.
**Keywords:** General contracting; Current situation; Problems, Countermeasures; China

## 1 The development and current situation of GC in China

General contracting (GC) refers to the GC enterprise accept the consignment of the investors, according to the contract, in charge of the whole process such as engineering survey, design, procurement, construction and test operation (completion acceptance), etc. or the several stage contract.

GC has been developed for more than 20 years in China, and Chinese enterprises have gradually accepted this advanced organization model of engineering construction. In these years, many units, such as engineering survey, design, construction, supervising and other related units, have made explorations and practices at different levels in GC and project management (PM).

The Ministry of Construction of P.R. China released "Guiding Opinions on the Fostering and Development of Enterprises for Project General Contracting and Project Management" in February 13, 2003, it provides the concrete and operable implementing measures for further completing and promoting the models of GC and PM. Under its promotion, GC and PM. has undergone rapid development in recent years.

According to statistics of China Exploration & Design Association (CEDA) and China National Association of Engineering Consultants (CNAEC), the total GC gross revenue completed by top 100 contractors was 37 billion Yuan in 2003, up 22.9 percentage points over the previous year (Guang 2006).

The former 10 companies in 2005 ranking of the Top 60 Chinese Contractors are listed in Table 1.

Table 1 the former 10 Chinese Contractors

| 2005 Rank | Company | General Contracting Gross Revenue ($millions) | Domestic ($millions) |
|---|---|---|---|
| 1 | China Railway Engineering Corporation | 11,645 | 10,967 |
| 2 | China Railway Construction Corporation | 11,272 | 10,892 |
| 3 | China State Construction Engineering Corporation | 11,092 | 9,364 |
| 4 | China Metallurgical Construction (Group) Corporation | 6,003 | 5,806 |
| 5 | China Harbour Engineering Company (Group) | 4,430 | 3,505 |
| 6 | Shanghai Construction (Group) General Co. | 3,811 | 3,430 |
| 7 | Sinohydro Corporation | 2,990 | 2,687 |
| 8 | China Road & Bridge Corporation | 2,778 | 2,489 |
| 9 | Beijing Construction Engineering Co., Ltd. (Group) | 2,116 | 2,084 |
| 10 | Zhejiang Construction Investment Group Co., Ltd. | 1,909 | 1,790 |

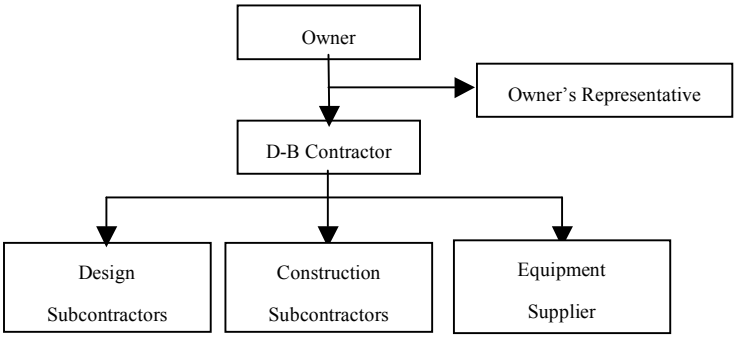
2005 Ranking of the Top 60 Chinese Contractors, compiled by Engineering News-Record (ENR) and

Construction Times, results: the total gross revenue of the top 60 contractors was 790 billion Yuan in 2005 (600 billion Yuan in 2004). The gap in gross revenue between the leading enterprises in the top 60 contractors and the international leading contractors is gradually reduced. The first in the ranking-China Railway Engineering Corporation achieved the revenue of 11645.49 million dollars (RMB 96.3 billion), no big difference with that of the former 10 companies listed in ENR TOP 225 International Contractors (ENR 2006a).

## 2 GC Approaches in China

### 2.1 Design–Build (D-B)

The design-build form of project delivery is a system of contracting whereby one entity performs both architectural/engineering and construction under one single contract. Portions of the overall design or construction work can be performed by the design-build entity or subcontracted out to other companies that may or may not be part of the design-build team (Zhang et al 2005). Some domestic construction projects, such as Jinjiang Square built by Tianjin Construction Group (TCG), Shanghai Jin Mao Building built by Shanghai Construction Group (SCG), and Zaozhuang Government Affair District built by Beijing Urban Construction Group Corp. (BUCGC), are adopted this approach (Gong 2004a). Figure 1 shows organizational structure of a design-build project.




### 2.2 Engineering procurement construction (EPC) and the Lump Sum Turnkey (LSTK)

Engineering procurement construction (EPC) refers to that the project general contractor undertakes the design, procurement, construction, trial operation, and the other services of the project, takes the full responsibilities of the quality, safety, time limit and cost management of the project in accordance with the contract (Jinag 2005). Figure 2 shows organizational structure of an EPC project.

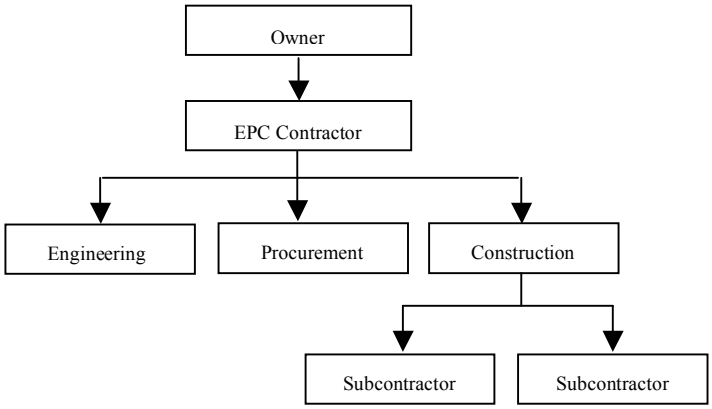



Figure 2 Organizational structure of an EPC project

Lump Sum Turn Key is the extension of operations and responsibilities of EPC. The objective of the Lump Sum Turnkey is to delivery a construction project, which can satisfy the functional requirements and conditions for usage.

EPC is mainly applied to the fields of industry construction with large device or technological processes as core technology, such as chemical, rubber, metallurgical, pharmaceutical, energy and other projects (Zhang 2003, Fu 1999, Peng 1999, Qiao et al 2005). In these fields, the procurement and installation of equipment are the most critical processes of project construction, and also closely related to technological design; therefore, these fields primarily use EPC.

At the present time, EPC is less used by Chinese construction enterprises, but has been paid more and more attentions for it is the direction of GC. For example, it has been used in Shougang cold rolling mill project built by China Metallurgical Construction (Group) Corporation (MCC), Beijing Lexijinxing Building built by China Construction First Division Construction & Development Co. (CCFDD), and so on. More than 80% of the overseas projects undertaken by China Petroleum Engineering & Construction (Group) Corp. (CPECC) are EPC projects.

### 2.3 Procurement-Construction (P-C)

There are some projects adopted this approach, such as Beijing Oriental Plaza built by Beijing Construction Group, Dalian cultural Square and Nanning Exhibition Center built by China Construction Eighth Engineering Division (CCEED), Beijing Chang'an Hotel built by Shanxi Construction Group (SCG).

There are other GC approaches, including Engineering-Procurement (E-P), Build-Operate-Transfer (BOT) and Public/Private Partnership (PPP), etc. They can be used in accordance with the different type of projects and the requirement of investors.

## 3 The existent problems of GC in China

### 3.1 The main problems existing in enterprises

(1) The organizations of the design units are deficient

According to a report of ENR, 25% of the top 100 international design firms 2006 rankings by 2005 revenue are EC (Engineer/Contractor) design firms (namely EC engineering corporations), as shown in Table 2 (ENR 2006b). Most of the ENR Top 225 International Contractors are also the top design firms. It is obvious that EC engineering corporations are very developmental in developed countries.

Table 2 statistics of all types of design firms

| Total | A | AP | AO | EAP | E | EC | EAC | PL | AE | EA | ENV | ALP | CM | GE | L | O |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 100 | 3 | 0 | 0 | 1 | 28 | 25 | 5 | 0 | 8 | 20 | 8 | 1 | 1 | 0 | 0 | 0 |
| 500 | 68 | 2 | 1 | 5 | 191 | 37 | 5 | 1 | 64 | 85 | 21 | 3 | 1 | 15 | 1 | 0 |

Key to type of Firm: A=architect; E=engineer; P=planner; EC=engineer-contractor; AE=architect-engineer; EA=engineer-architect; ENV=environmental; GE=geotechnical engineer; L=landscape architect; O=other. Other combinations possible. Firms classified themselves.

In China, only about 15% of design units really operate according to international engineering corporation operating models, about 67% of design units have not set up project control division, procurement division, construction management division, and trial operation (driving) division, they only set up a secondary institutions—Department of GC (CEDA 2002). The proportion of pure-play design institutes is high, and the proportion of EC engineering corporations is low; a certain proportion of the design institutes should gradually change into EC engineering corporations to meet the needs of the construction market (Hu 2003).

(2) Construction enterprises generally lack of design capability.

All construction enterprises, which get going GC better, have both construction business and design business, such as China Metallurgical Construction (Group) Corporation (MCC), Shanghai Construction Group (SCG),

China State Construction International Co. (CSCEC), and Beijing Urban Construction Group Corp. (BUCGC), etc. The lack of design capability is the key factor that restrains the development of GC of construction enterprises. However, because of the domestic market growth and quality barriers and other reasons, the enterprises focusing on construction is generally limited to procurement-construction.

(3) Project management system is imperfect

Engineering corporations must establish sound PM systems, including resource support system, procedures documents, work instruction Documents, workbooks, etc. About 50% of Chinese construction enterprises do not establish a sound PM system (Hu 2003). Without a sound project management system, it is difficult to systematically and effectively manage a project. There are random, disorderly and blind phenomena in the management of many projects. The main reason of these phenomena is no project management systems or no perfect project management systems.

(4) Lack of high-quality PM talents

The lack of talents has always been one of the important reasons of the gap between the Chinese enterprises and the international large contractors. From the personnel composition analysis, most of GC enterprises are lack of compound senior PM talents who can manage projects in accordance with internationally accepted PM models, procedures, methods, standards, and have managerial skills of large-scale projects (Gong 2004b, Zhou et al 2005).

(5) Lag in PM techniques

There are few companies that use computer integrated PM system and fewer companies that establish operating manuals and databases in accordance with EPC approach. Some units use software of P3 only in construction management plan. Therefore, most of Chinese construction enterprises' PM techniques are behind the times. Due to the lag in PM techniques, China had to employ foreign project management companies or engineering corporations to play the primary role in the management of many large-scale projects.

## 3.2 The main problems in external environment of enterprise

(1) Market identity degree about GC is low

At present, the identity degree of construction market about GC is still relatively low (Wang et al 2004). People have not recognized the superiority of GC. In addition, because Chinese government or state-owned enterprises invest most of the current projects, the project owners are short of genuine interest in benefits (Zheng et al 2004). This also affects the identity degree about GC. In industrialized countries, the market identity degree about GC is much high. Design Build Institute of America (DBIA) reported, by 1996 design-build had grown to nearly 20 percent of the project delivery market. In the five years after that, the market share for design-build project delivery doubled, and the rapid growth is expected to continue. Many industry analysts forecast that design-build will exceed 50 percent of the construction market between 2005 and 2010 (Zhang et al 2005).

(2) The legislation of GC is insufficient

In the legal framework of construction of China, there are three laws, namely, "the Construction Law of the People's Republic of China," "the Contract Law of the People's Republic of China", and "the Bidding Law of the People's Republic of China." Only "the Building Law" mentions: "Advocate general contracting for construction engineering," but it is difficult to be carried out because its maneuverability is not great. In "the Bidding Law ", there is a regulation that the winning tender must not subcontract the main and key works to others. But all construction tasks are usually subcontracted to others in GC, so there are legal conflicts and obstacles (Gong 1999, Xiong et al 2005). Although "the Code of Management of Engineering Project Contracting for Construction Projects" written by China Exploration & Design Association Construction Project Management and General Contracting Committee, has been worked out and submitted to the Ministry of Construction, China does not promulgate a contract for GC adapted to Chinese laws and international common practice. In a word, the GC market is still not regulated in China. The imperfection of legislation makes against the healthy development of GC in China.

(3) Lack of government policies

The competent authorities of all levels have a lack of uniform cognition and support to GC and PM, and some competent departments of construction administration only recognize the construction general contracting. China is being the transition period from planned economy to market economy, certain provisions and practices established in planned economy still remain valid, or its effects still exist. Under such circumstances, government policy support will play a crucial role.

# 4 Countermeasures on Developing GC

## 4.1 Strengthening the Enterprises' Self-Building

At present, comparing with international engineering corporations, most of the Chinese engineering corporations and design institutes in possession of GC capability make great differences in enterprise systems, organizations, PM systems, PM personnel qualities, and PM techniques. They must adopt internationally accepted management models, procedures and methods; otherwise they will not be able to compete with international engineering corporations.

(1) Developing General Contractors based design institutes

Currently, there is a lack of functional body of PM in the organizations of most of Chinese design institutes, such as the Departments for project management, control, procurement, construction, trial operation (driving), this have a strong impact on the quality and efficiency of a GC project. Design institutes should make cooperation with strong construction enterprises to realize win-win association and bring larger, stronger and superior GC enterprises

(2) GC enterprises should pay attention to introduction and self-cultivation of talents.

Chinese GC enterprises are in a stage of development, and necessarily require first-class specialized personnel in technology, economics, management, foreign languages, and law. Enterprises should actively attract professional graduates, and provide as many training opportunities as possible to enable them to play an early role; send personnel to participate in the general contracting project management training, and works with foreign companies renowned for training cooperation.

(3) Development of GC enterprises should follow the guidance of the market.

To develop GC enterprises is to enhance the international competitiveness of Chinese enterprises, but should avoid rushing into mass action. Design units and construction units should not be incorporated simply and administratively. The incorporation of them should follow the guidance of the market, and enterprises voluntarily realize win-win association. Some design or construction units, which do not have the conditions of GC, should turn to be professional contractors, thus can avoid cut-throat competition, and be propitious to the steady development of construction market.

## 4.2 Strengthening the Construction of Enterprise External Environment

(1) Increasing the propaganda of GC

At the present time, the competent authorities of the government and the owners are lack of understanding of GC. The following measures can be taken to deepen understanding and seek unity of thinking: First, training the staff of the competent authorities of all levels in construction field, deepening their understanding; Second, propagandizing, spreading and reporting the characteristics, advantages and representative examples of GC to make it gradually recognized by society; Finally, training the owners of the government investment projects and the state-owned enterprises investment projects and promoting GC in their projects.

(2) Accelerating the process of legislation so as to provide legal basis for further advancing GC

The competent authorities of all levels in Construction field, especially the Ministry of Construction, should constantly improve the laws and regulations and technical standards relevant GC, including the Construction Law, the Bidding Law, and other related laws and regulations, and should prepare projects financing, financial guarantees and related tax policies. It should be legally allowed that the contractors contract for projects with fund and capital; for projects with fund, the lowest interest rates and repayment periods should be clear in a

legal form in order to reduce the contractors' financial risk.

(3) Reforming the Bidding Procedures

The experiences of Chinese GC and PM have shown that reforming the existing bidding procedures, carrying out bidding mechanism based on design development, and putting construction documentation into market; are objective needs of the operational mechanism of construction market and GC. In July 2005, the Ministry of Construction and other five Departments jointly promulgated " Certain Opinions on Speeding up the Reform and Development of the Construction Industry." This decree put forward "Separate constructional drawing design and conceptual design," which fully meets the needs of the market and provides an important basis for the next step of reform of bidding system. At present, the key is to prepare detailed documents as soon as possible.

It is reported that China Petroleum & Chemical Engineering Survey and Design Association (CPCESDA) and China Exploration & Design Association (CEDA), commissioned by the Ministry of Construction, together undertake the monographic studies of "Contract for General Contracting" and "Bidding Procedures for General Contracting". The preparation of these two documents will play very active roles in standardizing the GC market access and promoting the GC market development.

## 5 Conclusions

China's GC has undergone rapid development in recent years and the Chinese contractors' international competitiveness has been continuously increased. However, there are still many problems in the GC development, notably: (1) The organizations of the design units are deficient; (2) The construction enterprises generally lack of design capability and high-quality PM talents; (3) The project management systems of GC enterprises are imperfect; (4) Market identity degree about GC is low; (5) The legislation of GC is insufficient.

Based on these problems, the countermeasures are mainly as follows: (1) Design institutes should make cooperation with strong construction enterprises to realize win-win association and bring larger, stronger and superior GC enterprises; (2) GC enterprises should pay attention to introduction and self-cultivation of talents; (3) The competent authorities of all levels in Construction field should constantly improve the laws and regulations and technical standards relevant GC.

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